

STATE AND PRIVATE FORESTRY
Insect and Disease Control
USDA-Forest Service

BIOLOGICAL EVALUATION

WESTERN PINE BEETLE INFESTATION
COTTONWOOD COMMERCIAL THINNING SALE
EMMETT RANGER DISTRICT
BOISE NATIONAL FOREST
1976

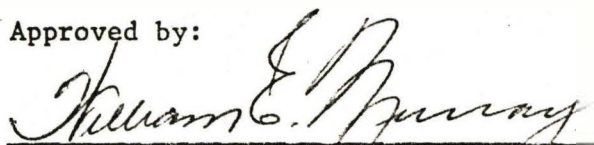
by

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Fig. 1. Western pine beetle caused mortality in heavily stocked second growth ponderosa pine. Cottonwood commercial thinning sale, prior to logging, Emmett Ranger District, Boise NF, Idaho, May 1976.



Fig. 2. Western pine beetle killed ponderosa pine. Many larvae removed from outer bark by woodpeckers during late winter. Emmett Ranger District, Boise NF, Idaho, May 1976.

BIOLOGICAL INFORMATION

Initial District reconnaissance subsequent to winter damage showed a high average basal area and dense stocking of trees. Timber sale plans in 1973 called for a commercial thinning that would reduce basal area and increase tree spacing. This would release better trees from competition for increased vigor and growth rate.

An evaluation on the ground identified the primary tree killer as the western pine beetle in outbreak proportions. It was recommended that the sale be expedited if possible.

SAMPLING PROCEDURES

To complete the evaluation and determine intrinsic stand factors contributing to the insect buildup, the 350-acre timber sale area was cruised for insect damage. Infestation centers were examined for: (1) number of dead trees, (2) volume of dead trees, (3) basal area, and (4) size in acres.

Volumes were taken using a 3-P sampling scheme; tree heights were measured with a Relaskop and tree diameters (dbh) with a D-tape. Every tenth tree was measured and intervening trees were estimated. The ratio between actual measurements and estimates was then used to correct total volume of tree mortality. Basal area (BA) measurements were taken with a Relaskop within each killed group. In large groups a number of BA readings were taken and averaged.

RESULTS AND DISCUSSION

The western pine beetle killed 1,469 trees amounting to 327 MBF of merchantable sawtimber ($\geq$ 8 inches dbh) primarily in 35 major infestation centers scattered over the sale area prior to logging. Of total tree mortality, 1,087 trees died in 1975 compared to 382 trees killed earlier. Merchantable beetle-killed trees averaged 229 bd.ft. each. All merchantable and unmerchantable trees killed ranged in size from 5 to 44 inches dbh, Figure 5. Interesting to note was the almost triple increase in tree mortality in 1975 or more than 2.85 trees killed for every one killed earlier. The 35 infestation centers totalled approximately 12.3 acres in size. Largest group killed was 164 trees on 1.2 acres.

Top-broken ponderosa pine from the winter storms of 1971-72 were examined and in almost every instance were verified as old, western pine beetle brood trees. Broken tops on the ground showed evidence of pine engraver activity. High stocking and basal area prior to logging

appeared to favor beetle increase, Figures 1 and 3. Measurements taken within all infestation centers showed that the western pine beetle preferred stands with high basal area. Average square feet of basal area within infestation centers was 276 with a range from 140 to 480, Figure 6.

Logging of the sale was accomplished in November 1976. Even though the sale was delayed for three years, a hallmark of silvicultural management was accomplished, Figure 4 and frontispiece. Before logging, the average tree spacing was less than 13x13 feet; the average tree spacing was increased to approximately 21x21 feet by removing 2,427 MBF of commercial sawtimber on 350 acres. In addition, the logger was able to salvage most of the trees killed in 1975 amounting to about 70 percent of the dead volume.

Wide spacing of residual trees correlated with a basal area of 90 square feet should minimize losses from western pine beetle until a relatively high basal area is again attained.

ACKNOWLEDGMENT

Donald J. Mellon, R-4 Measurements Specialist, suggested and familiarized us with the 3-P sampling scheme that saved us much time and statistically corrected the volume measurements from our field data.

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Fig. 3. High stocking, high basal area - second growth ponderosa pine prior to logging. Cottonwood commercial thinning sale, Emmett Ranger District, Boise NF, Idaho, 1976.



Fig. 4. Adequate spacing, lower basal area, post-logging, Cottonwood commercial thinning sale, Emmett Ranger District, Boise NF, Idaho, 1976.

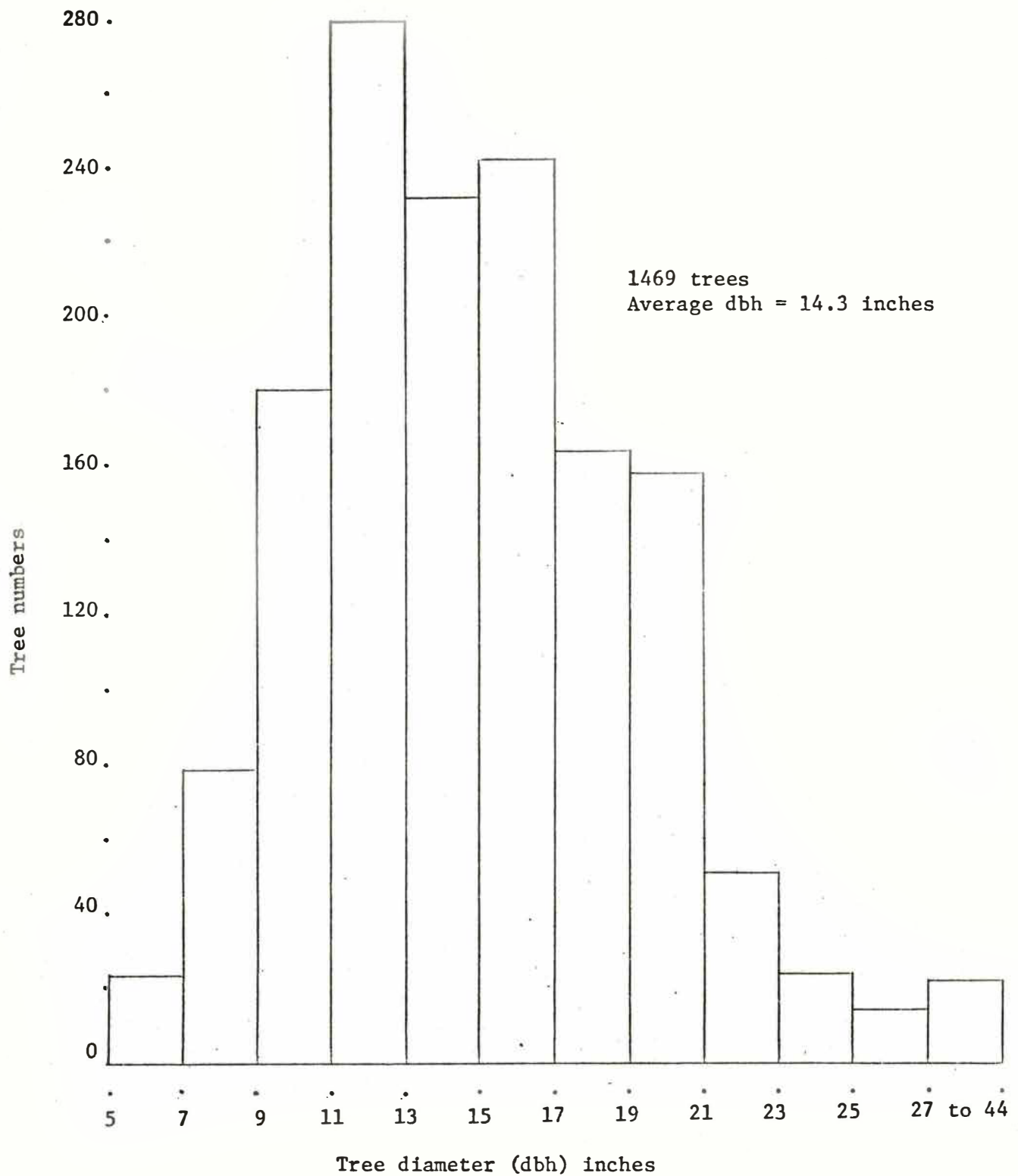


Figure 5. Size distribution of ponderosa pine trees killed by western pine beetle, 1973-76, Cottonwood commercial thinning sale, Emmett Ranger District, Boise National Forest, Idaho.

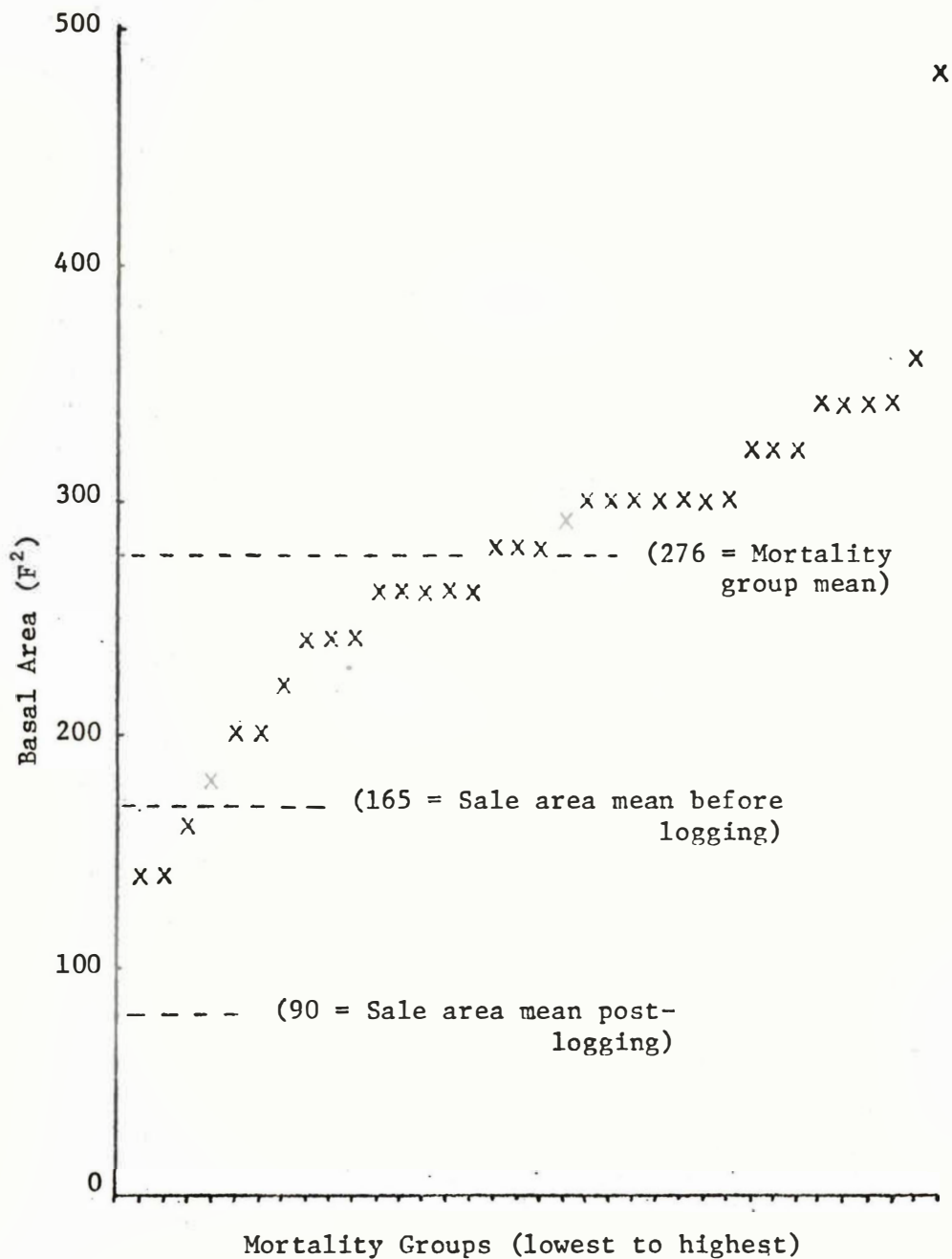


Figure 6. Basal area of ponderosa pine groups killed by western pine beetle, 1973-76, Cottonwood commercial thinning sale, Emmett Ranger District, Boise NF.